NAME INDEX

(To the *Journal*, Volume 18)

Allen, J. E. Retirement from Council, 314.
Andrews, S. A. Discussion at Rocket and Satellite Instrumentation Symposium, 27, 38, 39.
Arend, Peter C. Vander, and Scharle, W. J. Paper: "Production, Storage and Handling of Liquid Hydrogen", 181.
Arthur, P. D. *See* Stark, H. M.
Astbury, N. F. Discussion at Materials for Space Technology Symposium, 382.
Atkinson, R. d'E. Discussion at Space Navigation Symposium, 155, 157.

Bailey, A. B., Cruddace, R. G. and Ricketson, B. W. A. Paper: "Use of Liquid Hydrogen in the Third Stage of a Satellite Vehicle", 203.
Bailey, C. E. G. Discussion at Rocket and Satellite Instrumentation Symposium, 19.
Barnes, R. S. Paper: "Effect of the Radiations Encountered by Materials in Space", 377.
Barr, J. D. Discussion at Space Navigation Symposium, 157-8.
Beakley, W. R. Discussion at Rocket and Satellite Instrumentation Symposium, 39.
Bedford, L. H. Discussion at Space Navigation Symposium, 156-7.
Bevan, John S. Correspondence on "Radiation Protection and Measurement", 311.
Bossart, K. J. Awarded B.I.S. Astronautics Medal, 411.
Bowdler, —. Discussion on "Design of Large Rocket Engine Test Beds", 68.
Bowen, P. J. Discussion at Materials for Space Technology Symposium, 359.
Bragg, S. L. and Wallace, V. A. Paper: "Control of the Rate of Thrust Build-up in a Liquid Propellent Rocket Engine", 426.
Breen, L. *See* Forster, R. H. B.
Brennan, M. Retirement from Council, 256.
Briggs, Michael H. Papers: "Chemistry of the Lunar Surface", 386; "The Distribution of Life in the Solar System: An Evaluation of the Present Evidence", 431.
Broomfield, R. E. Death, 287.
Brun, E. A. Elected I.A.F. Vice-President, 316.
Bunting, D. Paper: "The Development of Nozzle Materials", 362; reply to discussion, 382.

Carter, A. F. Death, 287.
Carter, L. J. Honoured by Deutsche Raketen-Gesellschaft, 83; presents Accounts and Balance Sheet for 1960, 313; appointed Executive Secretary, 383.
Carton, D. Discussion at Rocket and Satellite Instrumentation Symposium, 10.
Cashmore, D. J. Elected Member of Council, 256, 313-4; paper: "The Role of Inertial Equipment", 138; reply to discussion, 156-8.
Christopher, P. A. T. Discussion at Rocket and Satellite Instrumentation Symposium, 10, 20.
Cleaver, A. V. Awarded Honorary Fellowship, 411, 443; papers: "The Use of Liquid Hydrogen in Large-Scale Rockets", 189; "The Blue Streak Rocket Propulsion System", 259; correspondence on "The British Rocket Industry", 115; discussion at Liquid Hydrogen Symposium, 248.
Cook, P. F. Discussion at Rocket and Satellite Symposium, 10.
Courtenay, W. Death, 287.
Cross, C. A. Correspondence on "Minimum Energy Entry into Planetary Satellite Orbits", 161.
Crosse, C. R. Discussion on "Design of Large Rocket Engine Test Beds", 68.
Cruddace, R. G. (*see also* Bailey, A. B.) discussion at Liquid Hydrogen Symposium, 199, 248; correspondence on Liquid Hydrogen Symposium Issue, 311.
Cummings, (Miss) Ruth. Correspondence on "The First Astronauts", 161.

Dauncey, S. R. Correspondence on "Delays in Publication", 441.
Davies, G. N. Discussion at Liquid Hydrogen Symposium, 248.
Dean, Alvano. *See* Forbes, George F.
Demetriades, Sterge T. Paper: "Preliminary Study of Propulsive Fluid Accumulator Systems" 392.
Dingle, Herbert. Correspondence on "Relativity and Space Travel", 40, 76.
Donnithorne, W. Discussion at Materials for Space Technology Symposium, 360.
Dryden, Hugh L. Awarded Honorary Fellowship, 411, 443.
Dunning, J. E. P. Discussion at 16th Annual General Meeting, 314.
Dweck, E. E. Discussion at Space Navigation Symposium, 138, 158.

Elterton, G. C. Discussion at Rocket and Satellite Instrumentation Symposium, 39.
Emley, E. F. Paper: "Magnesium in Space Technology", 340; reply to discussion, 360.
Ewat, D. G. Paper: "The Effect of Atmospheric Drag on the Orbit of a Spherical Earth Satellite", 269; correspondence on "Effect of Drag on Satellite Orbits", 250.

Faust, Heinrich. Paper: "The Scientific Necessity for a Rocket Network in Europe", 306.
Fea, K. H. Paper: "The Relation between Height Error and Elevation Error for an Earth Satellite", 114.
Fielder, Gilbert: Discussion at Space Navigation Symposium, 158.
Forbes, George F. and Dean, Alvano. Paper: "Minimization Conditions for Powered Trajectories", 281.
Forster, R. H. B. and Breen, L. Paper: "Some Problems Encountered in the Design of Large Rocket Engine Test Beds", 55; reply to discussion, 67-9.
Fugate, R. E. Death, 287.
Foss, A. B. Appointed South Australian Branch Secretary, 77.

Gagarin, Yurii. Awarded B.I.S. Gold Medal, 170, 255.
Ganguly, N. K. and Lance, J. T. Paper: "Shielding Manned Space Vehicles from Space Radiations", 110.
Gardner, J. R. Discussion at Liquid Hydrogen Symposium, 247-8.
Gartmann, H. A. Death, 287.
Gatland, K. W. Elected Member of Council, 256, 314; elected Vice-President, (for 1961-62) 256, (for 1962-63) 443.
Gittings, H. T. Death, 287.
Golovine, M. N. Elected Vice-President, (for 1961-62) 256, (for 1962-63) 443; obituary of Stewart Scott Hall, 162.
Golton, E. Paper: "The Free Body Motion of Earth Satellites and Associated Radio Effects", 437.
Greenwood, S. W. Elected Member of Council, 256, 314; papers: "Minimum Energy Entry into Planetary Satellite Orbits", 73; "Minimum Energy Entry into Planetary Parabolic Orbits", 108; "Minimum Energy Entry into Orbits around Mercury", 159; "Entry into Circular Planetary Satellite Orbits", 310; correspondence on "European Space Programme", 382; "Reconnaissance Orbits", 253; "Stationary Satellites", 161.
Groves, G. V. Elected Member of Council, 443.

Haley, A. G. Awarded B.I.S. Astronautics Medal, 411.
Hall, S. S. *See* Scott-Hall, S.
Harcrow, Harry H. Paper: "Optimum Trajectory of *n*-Stage Missiles.", 70.
Hartford, M. W. Correspondence on "Thrust Units", 76.
Hatfield, H. R. Discussion at Space Navigation Symposium, 157.
Hayre, H. S. Paper: "Surface Roughness of the Moon", 389.
Heller, F. P. Discussion at Space Navigation Symposium, 157.
Herman, R. Correspondence on "Relativity and Space Travel", 40, 282.
Herrick, Samuel. Paper: "The Demands of Nearly Parabolic Lunar Trajectories on Differential Correction and Perturbation Theory", 131.
Higgins, J. K. Discussion at Materials for Space Technology Symposium, 359, 382.
Hilton, W. F. Biography, 80.
Holmes-Siedle, A. G. Discussion at 16th Annual General Meeting, 314.
Hope-Jones, E. Scrutineer at 16th Annual General Meeting, 314.
Hunt, M. S. Discussion at Liquid Hydrogen Symposium, 247-8.
—— and **White, B. G.** Paper: "Optimum Engine and Vehicle Coupling for Satellite Launching Stages Using Liquid Hydrogen", 199.
Hurden, D. Paper: "The Design of Rocket Engines Burning Hydrogen as Fuel", 192; reply to discussion, 198; correspondence on "Liquid Hydrogen Rocket Engines", biography 80, appointments, 83.
Hurden, R. E. *See* White, A. E. S.

Joliffe, S. A. W. Discussion at Rocket and Satellite Instrumentation Symposium, 27.

Kennedy, A. J. Discussion at Materials for Space Technology Symposium, 382.
Knight, S. G. 287.
Kurti, N. Discussion at Liquid Hydrogen Symposium, 248.

Ladd, P. J. Appointed Western Branch Secretary, 121.
Langton, N. H. Elected Member of Council, 443,
—— and **Soden, A. L.** Paper: "Polymers in Space", 329; reply to discussion, 359, 382.
Law, R. Discussion at Space Navigation Symposium, 155.
Lawden, D. F. Correspondence on "Minimum Energy Entry into Planetary Satellite Orbits", 253; "Optimum Trajectory of *n*-Stage Missiles," 251.
Lance, J. T. *See* Ganguly, N. K.
Lennox-Napier, —. Discussion on "Design of Large Rocket Engine Test Beds", 67-8.
Leonard, J. O. Secretary of Washington Branch, 44.
Lloyd, T. Discussion at Materials for Space Technology Symposium, 361.

McLauchlan, D. J. and Walters, T. T. Paper: "An Equipment for Processing Time-Multiplexed Telemetry Data", 33; reply to discussion, 38-9.
Maclean, Ian. Discussion on "Design of Large Rocket Engine Test Beds", 69.
McNab, G. B. Death, 287.
Maher, L. E. Discussion at Liquid Hydrogen Symposium, 247.
Maxwell, W. R. Elected Member of Council, 256; elected President, 256, 443; Report of Council (1960) 118, 313; (1961) 409; Presidential Addresses: "Some Aspects of Recent Progress in Astronautics" (1961) 295; "Some Aspects of the Origins and Early Development of Astronautics" (1962) 415; remarks at symposia: 3, 10, 171, 319; biography, 314.
Maynard, J. K. Discussion at 16th Annual General Meeting, 313.
Megson, N. J. L. Discussion at Materials for Space Technology Symposium, 359, 361, 382.

Mitchell, G. L. Discussion on "Design of Large Rocket Engine Test Beds", 69.
Monroe, A. G. Discussion at Liquid Hydrogen Symposium, 198.
Moore, Patrick. Correspondence on "The West Ford Project: A Possible Future Application?", 405.
Mottram, A. W. T. Paper: "**The Measurement of the Performance of Liquid Propellent Rocket Engines**", 28. Correspondence on Liquid Hydrogen Symposium 248.
Moyse, J. A. Discussion at 16th Annual General Meeting, 313.
Murphy, A. J. Paper: "**A General Survey of the Materials Problem**", 320; discussion at Materials in Space Technology Symposium, 359, 361.
Mustelin, Nils. Correspondence on "Minimum Energy Entry into Planetary Satellite Orbits, 252; "Stationary Satellites", 41.

Nicoll, N. R. Elected Member of Council, 443.
Noton, A. R. Maxwell. Paper: "**Guidance of Space Vehicles by Radio Measurements and Command**", 132.
Nunneley, J. Correspondence on "The Journal", 75.
Nyman Alexander. Corespondence on "Manned Navigation and Guidance in the Solar System", 42.

Okriss, E. Correspondence on "Electrical Theory of Gravity", 254.

Pardoe, G. K. C. Biography, 80.
Pearson, —. Discussion on Design of Large Rocket Engine Test Beds, 68.
Pike, E. W. Discussion at Space Navigation Symposium, 158.
Porter, J. G. Discussion at Space Navigation Symposium, 156-7.
Powell, C. Discussion at Space Navigation Symposium, 155-6.
Pressey, B. G. Paper: "**Ground Equipment for Radio Observations on Artificial Satellites**", 20; reply to discussion, 27.

Ricketson, B. W. A. (*see also* Bailey, A. B.) reply to correspondence on "Liquid Hydrogen in the Third Stage of a Satellite Vehicle", 249.
Ring, J. Paper: "**Ultra-Violet Observations from Satellites**", 17; discussion at Rocket and Satellite Instrumentation Symposium, 10, 19, 20.
Roberson, R. E.: Discussion at Space Navigation Symposium, 157.
Roberts, G. G. Scrutineer at 16th Annual General Meeting, 314.
Robins, M. O. Paper: "**An Outline of the British Space Research Programme**", 4, reply to discussion, 10.
Roth, J. Reece. Paper: "**A Preliminary Study of Thermonuclear Rocket Propulsion**", 99.

Sänger, E. Paper: "**Some Optical and Kinematical Effects in Interstellar Astronautics**", 273.
Sage, G. N. Discussion at Materials for Space Technology Symposium, 360, 382.
Sandeman, E. K. Discussion at Space Navigation Symposium, 155; at Liquid Hydrogen Symposium, 198.
Savage, G. W. Scrutineer at 16th Annual General Meeting, 313.
Scharle, W. J. (*See also* Arend, Peter C. Vander.) Reply to discussion at Liquid Hydrogen Symposium, 198.
Scott-Hall, Stewart. Obituary 162. Appointed Secretary of Victoria Group, 77.
Shapton, R. W. Discussion at Materials for Space Technology Symposium, 360.
Shaw, —. Discussion at Materials for Space Technology Symposium, 361.
Shepherd, L. R. Awarded Honorary Fellowship 411, 443, elected I.A.F. President, 316; discussion on "Design of Large Rocket Engine Test Beds", 66.
Singer, S. Fred. Awarded B.I.S. Astronautics Medal, 411.
Slater, A. E. Elected Member of Council, 256; 314.
Small, J. M. Appointed Secretary of New South Wales Group, 77.
Smith, I. E. Discussion at Liquid Hydrogen Symposium, 198.
Smith, K. C. *See* Webster, T. J.
Soden, A. L. *See* Langton, N. H.
Stark, H. M. and **Arthur, P. D.** Correspondence on "Optimum Trajectory of *n*-Stage Missiles", 251.
Stehling, Kurt R. Paper on "**Behaviour of Liquid Hydrogen in a Space Environment**", 245; reply to discussion 247-8.
Stevens, W. H. Correspondence on Thiokol, 442.
Stewart, P. A. E. Papers: "**Surface Navigation on the Moon**", 149 (reply to discussion, 155-6, 158); "**Liquid Hydrogen as a Working Fluid in Advanced Propulsion Systems**", 225 (reply to discussion 247); discussion at Rocket and Satellite Instrumentation Symposium, 38.
Stockton, —. Discussion on "Design of Large Rocket Engine Test Beds", 68.
Strutt, Antony. Appointment, 83.
Surtees, H. Elected Member of Council, 443.
Sykes, R. Secretary of Western Branch, 121.

Thatcher, (Mrs.) R. G. Death, 287.
Thaxter, —. Discussion on "Design of Large Rocket Engine Test Beds", 67.
Thompson, G. V. E. Editorials: "A Year of Promise", 1; "The First Astronauts", 53; "Into Space!", 97; "Manned Spaceflight", 129; "Honours and Awards", 169; "Privileges and Obligations", 257; "John Glenn's Spaceflight", 293; "European Space Programme", 293; "The Future of British Astronautics", 317; "Space Pollution", 385; "Five Years of Spaceflight", 413; discussion on Design of Large Rocket Engine Test Beds, 67; discussion at Materials for Space Technology Symposium, 359-61; discussion at 16th Annual General Meeting, 134; appointments, 83.

von Braun, W. Awarded B.I.S. Gold Medal, 170, 255.

Waddington, C. J. Paper: "**The Hazard of Corpuscular Solar Radiation in Manned Spaceflight**", 277.
Walker, —. Discussion at Space Navigation Symposium, 156.
Wallace, V. A. *See* Bragg, S. L.
Walters, T. T. *See* McLauchlan, D. J.
Wapling, G. A. Discussion at Rocket and Satellite Instrumentation Symposium, 38.
Watts, A. T. Discussion at Rocket and Satellite Instrumentation Symposium, 27.
Webster, T. J. and **Smith, K. C.** Paper: "**Liquid Hydrogen Production on an Industrial Scale**", 172; reply to discussion, 198.
West, E. G. Paper: "**Aluminium in Space Engineering**", 354; reply to discussion, 360.
Wheeler, R. L. Discussion at Materials for Space Technology Symposium, 359.
White, A. E. S. and **Hurden, R. K.** Paper: "**The Use of Graphite in Space Technology**", 367; reply to discussion, 382.
White, B. G. *See* Hunt, M. S.
Whittington, (Mrs.) Helen V. Appointed Secretary of Washington Branch, 44.
Wilkins, H. P. Death, 287.
Wilkinson, F. J. Paper: "**High-Strength Steels**", 361.
Willmore, A. P. Paper: "**Instrumentation for the First Anglo-American Scout Satellite**", 11; discussion at Rocket and Satellite Instrumentation Symposium, 10, 27, 38.
Woods, W. J. Discussion at Materials for Space Technology Symposium, 361.
Wright, Alan. Correspondence on "Extra-terrestrial Life and Space Lawyers", 442.
Wyatt, O. H. Paper: "**The Use of Hydrogen in Nuclear Rockets**", 240.
Wyatt, P. J. Correspondence on "Optimum Trajectory of *n*-Stage Missiles", 283.

Zambelli, E. D. Paper: "**Earth Satellite Motion by General Perturbations**", 402.

ASTRONAUTICAL ABSTRACTS

Numbers refer to abstract numbers, not page numbers.

Nos. 1–305 on pp. 67–52
306–749 „ „ 84–96
750–976 „ „ 122–128
Nos. 977–1135 on pp. 163–168
1136–1287 „ „ 288–292

SUBJECT INDEX

Ablation, 1034, 1038–9.
Acceleration,
  effects on animals, 358, 385.
  human tolerance, 37.
Acoustics, in manned space flight, 399.
Aerodynamic,
  flow, effect on wall roughness, 55.
  heating, 53, 58–9, 409–10.
Aircraft, rocket-powered, 413–5.
Airglow, preliminary results, 769.
Algae, 782.
Alphonsus, volcanic outbreak, 6.
Amines, with nitirc acid, 218.
Antennae systems, 958.
Astronautics,
  birth and growth, 86.
  data sheet, 1154–5.
  decimal classification, 82.
  education and careers, 95, 101.
  philosophy, 98
  Soviet, 99.
Astronomy,
  films of planets, 308.
  interstellar wind, 307.
  space telescopes, 1138.
  stellar, 306.
  ultra-violet telescopes, 1139.
Astrophysics,
  nebular photometry, 980.
  ultra-violet spectroscopy, 981.
Atlas, 113.
Atmosphere,
  characteristics, 329, 335.
  density, 328.
  lunar, 9, 986.
  optical observations, 338.
  physics of, 339.
  planetary, 935.
  upper layers, 337.
Atmospheric entry, simulation, 61.
Attitude,
  off-on control, 164.
  space control, 144, 160–1.
  stabilisation, 323.
Auxiliary Power,
  general, 1125, 1129, 1278–9, 1281.
  solar energy, 709.
  turbo-electric, 717.

Beam Rider,
  aerodynamics, 273.
  systems analysis, 696, 702, 1264.
  theory, 270.
Biology,
  contamination, 780.
  general, 793.
  Sputnik II experiments, 31.
Black Knight, 686–8.
Boranes, 772.
Boron, 614.

Caesium ion rocket, 1103.
Cardiovascular functions, 389, 401.
Ceramics, 28–9, 352, 1159–60, 1162.
Characteristic velocity, 146.
Clock paradox, 10, 13, 322.
Closed system,
  atmosphere problems, 362–3, 370.
  biological control, 781.
Combustion
  chambers, 1241.
  instability, 579–80.
Communications satellites, 467–8, 534.
Contour nozzle, 1080.
Control
  automatic flight, 715.
  communications satellite, 534.
  flip/flop, 715.
  side jets, 517.
Cosmic,
  dust, 538.
  language, 805.
  radiation, 326–7, 330, 379, 992.
  rays, satellite observations, 993–5.
Cryogenics, 227.
Cylindrical satellite, rotation, 539.

Doppler effect,
  Earth satellites, 503.
  orbit determinations, 704.
Drag brake, 801.

Earth,
  magnetic field, 310, 313, 336.
  oblateness, 311–2.
Echo, 1057.
Electron density and energy, 987–8.
Electric power, in missiles and spaceships 278, 280, 282, 284.
Electrogravitics, 1249.
Energy conversion devices, 955.
Entry into planetary atmospheres, 408, 477.
Environmental control, for manned vehicles, 373.
Escape capsules, 1216.
Ethylene oxide, 1244.
Eye hazards, 402.

Falcon, 251.
Film cooling, 573–4.
Firestreak, 250, 252.
Flight dynamics, non-linear, 681.
Fluorine,
  general, 27.
  liquid, motor using, 591, 594, 596, 599
  oxygen, 605.
Free fall, liquid separation, 11.
Fuel cells, 279.

Gravity,
  artificial, 374.
  difference, detection of 1226,
  and interplanetary travel 14–15.
  turn, computing 153.

Guidance,
  control, 137.
  inertial, 261, 264–5, 271–2, 275, 699, 942–5, 1273–4.
  infra-red, 700, 947, 951–2, 967.
  interplanetary, 154, 1222.
  manufacturing requirements, 703.
  mid-course, 155.
  missiles, 697–9, 1258.
  navigational, 156.
  problems, 524.
  satellite, 518–9.
  spaceflight, 1225–6, 1228.
  steering jets, 187.

Heat,
  conduction in missiles, 20.
  on re-entry, 758, 761–3.
  transfer, 759–60, 876.
Hydrogen,
  propellent, 612.
  thermodynamics, 618.
Hypergolic bipropellents, 891, 893–906.
Hypersonic rocket planes, 803.
Hypothermia, protection role, 384.

Hyperventilation, hypoglycemia, 390.
Human reactions,
  to acceleration, 785–7, 795, 797.
  to re-entry, 1014.
  to rotation, 794.
  to vibrations, 796.
Hydrogen,
  liquid, safety aspects, 30, 1153.
  rocket engine, study, 617.

I.G.Y., solar flare programme, 24.
Inertial guidance,
  accelerometer, 264–5.
  effects of Earth, 1273.
  general, 942–5.
  instruments, 1274.
  review, 272, 275.
  stellar, 261.
  vibration effects, 271.
Infra-red,
  guidance, 947, 951–2, 967.
  spectral teleradiometer, 871.
  observations, 997.
Injection,
  criterion, 577.
  liquid oxygen, 576.
  principles, 575, 578.
Interstellar travel, 136, 354.
Ion propulsion, 106, 230, 627–635, 909–912, 1247–8.
Isolation studies, 388, 403–5.

Jupiter (planet), ionosphere, 309, 982–3.
Jupiter C (rocket),
  spin-control, 145.
  trajectory control, 276.

Life in space,
  manned capsules, 34–5, 37, 43.
  review of simulation experiments, 33.
  water recovery, 39.
Liquid propellents,
  data, 615.
  development, 219.
  engines, 201, 203, 206, 210.
  handling, 211–214.
  performance, 202, 207, 216.
  trends, 877.
Luminosity,
  in motor exhaust gases, 610.
Lunar probes, 125, 476, 505–6, 508, 1073.

Magnetic damping, of satellites, 1075.
Magnetic fields,
  and satellites, 823.
  measuring, 996.
Magnetofluiddynamics, 56.
Magnetohydrodynamics, 412.
Man in Space, 72–3, 360–1, 380, 1165–8.
Mapping, planetary, 751.
Mars,
  conditions on, 2.
  probe, 129, 475.
  radiometric observation of, 5.
  vegetation, 985.
Materials,
  alloys, 350.
  for astronautics, 344–346.
  high-temperature, 341.
  metals, 349.
  for rockets, 343.
  structures, 342.
Meteoric abrasion, studies, 753.
Meteorological rocket, 689.
Meteors,
  ablation, 423.
  metallic, 754.
  and origin of life, 32.
  results from U.S.S.R., 321.
Microbiology, extraterrestrial, 357.
Minitrack, Mark II, 955.
Missile(s),
  Atlas, 255.
  British, 239.
  design procedures, 258.
  dynamic stability, 241.
  Encyclopedia, 1257.
  general, 231–3, 651–8, 661, 664–7, 672.
  handling equipment, 914.
  Lockheed systems, 242.
  maximum range, 269.
  Polaris, 256.
  reliability, 248.
  test ranges, 243, 245.
  trajectories, 262, 1271.
  turbojet booster, 253.
  U.S.A., 240.
  U.S.S.R., 234, 249, 254.
  vibration testing, 246.
Molybdenum disilicide, 1161.
Monopropellents, 225.

Moon,
  atmosphere, 9.
  as manned spacestation, 128, 290.
  building on, 289.
  dust, 7.
  impact on, 319, 752.
  landing, 127, 132, 833.
  other side, 8, 315, 320.
  pioneers, 133.
  propulsion for landing manoeuvres, 135.
  prospecting, 316.
  research, 318.
  rocket observations, 130.
  surface features, 6, 314.
  U.S.A.F. plans, 126.
  volcano, 317.
Motors,
  Plungerjet, 593.
  residual fuel, 587.
  rocket, 589.
  thrust termination, 592.
  turbine inlet temperature, 586.

Navigation,
  automatic star sensors, 268.
  in space, 513.
  planetary, 515.
  theodolites, 274.
Nose cones, production, 675.
Nozzle, cold pressure, 1237.
Nuclear Energy, reports, 616.
Nuclear power in space, 736.
Nuclear propulsion,
  general, 121, 625, 1101–2, 1246.
  performance, 908.
  rockets, 617, 619, 623.
  satellite boosting, 620.
  shielding, 626.
  thrust optimization, 622.

Optimal transfer calculations, 531–2.
Orbital phase interpreter, 1227.
Orbit(s),
  close satellite, 140, 1066.
  corrections, 847.
  Earth–Mars, 529.
  equations, 151.
  elliptic elements, 152.
  general, 138–9, 524.
  lunar, 841, 845–6, 849, 1219.
  missiles, 525.
  near-circular, 158.
  satellites, 486–7, 489, 493–4, 843–4, 1068, 1070–2, 1074, 1220, 1223.
  perturbation techniques, 157, 845, 853.
  small-impulse, 521.
  solution, 1076, 1079.
  stability, 163.
  terminology, 490.
  three-dimensional, 1224.
  transfer, 528.
Oxygen, liquid,
  handling, 214.
  isothermal compressibility, 223.
  material compatibility, 771.
Oscar, 1059–60, 1285.

Photon propulsion, 636–7.
Physiology, in spaceflight, 372.
Pioneer, 131.
Plasma, arc-heated, 62.
Plastics,
  heat-resistant, 778.
  reinforced, 353.
Pressure suits,
  anoxia and, 386.
  denitrogenation, 387.
  navy, 392.
  thermal comfort, 396.
Propellents (see also Solid propellants).
  free radicals, 884.
  high-energy composites, 221.
  hypergolic, 893–906.
  liquids and solids, 174, 226, 889.
  new, 222.
  performance of, 224.
  petroleum, 881.
  Polaris, 907.
  propergols, 886.
  review, 1099, 1100.
  solids, 444, 882, 890, 1083.
  storable, 228.
  throttling, 176.
  useful life, 1098.
Propulsion,
  advanced, 1081.
  atmosphere-breathing engines, 168.
  nozzle analysis, 541.
  ramjets, 166, 170–1, 173.
  review, 165.
  rocket, 184, 1082.
  rocket engine, 178.
  space engine, 178.

Propulsion (continued)
spacestation erection, 540.
steering jets, 187.
systems, 167, 545.
Propulsion systems, electric, 624–31, 634–645, 647–9.
Psychology,
astronaut problems, 1188.
evaluation for Manhigh, 51.
isolation, 49–50.
manned spaceflight (human factors), 52.
and physiology, 369.

Radiation,
belts, 1148–9.
data, U.S.S.R., 340, 978.
simulation, 824.
Radar, solid-state, 1283.
Radiator design, 1065, 1218.
Radio,
astennae, 286.
in astronautics, 281.
interferometry, 287.
observations, U.S.S.R., 1122.
Radioactivity ionisation gauge, 22.
Radio Astronomy, 977, 979, 1123.
Re-entry,
aerodynamic lift, 1018.
atmospheric heating, 94, 409.
calculations, 511.
capsule, 257.
design of vehicle, 87.
drag modulation, 411.
dynamic stability, 93, 510.
from orbit, 478.
heat protection, 19, 88, 1021.
nature of, 91.
navigation, 148.
oscillations, 1019.
planning programme, 90.
problems and progress, 87.
simulation, 416–7.
sublimation, 68.
technology of manned return, 85.
tumbling, 488.
Recovery of space vehicles, 447.
Relativity,
clock paradox, 10, 13, 755.
general theory, proof using satellites, 12.
Rendezvous techniques, 471.
Rocket engine(s),
calculations, 598, 604–6, 608–9.
developments, 180.
history, 183.
instability research, 179.
instrumentation, 175.
low-thrust, 106.
nozzle thrust, 181.
research in Canada, 186.
pressure flow measurement, 205.
throttleable, 209.
transparent motor, 208.
wall cooling, 204.
Rocket fuel testing, solids, 1245.
Rocket(s)
comparative analysis, 231–3.
history, 292.
step, 235–7.
velocity equation, 244.

Satellite(s)
dynamical study, 536.
Earth, 112, 117.
economics, 461.
entry into atmosphere, 116.
information from, 121, 706.
librations, 522.
manned, 119, 460, 462–3.
motion, relativistic, 504.
NASA programme, 115.
observation of, by radar, 707.
observations from, 141–3, 457, 464–6, 473, 707, 851–2, 854–6.
paddlewheel, 459.
power for, 712–3.
radiation measurements, 334, 819.
rockets and space, 67, 124, 192.
scanner, 458.
Soviet, 817, 820.
for space research, 118.
technology, 111.
telemetering, by frequency modulation, 708.
tracking, 120.
visibility, 474.
weather data, 333.
orbits, 496–7, 499–502, 507.
Skin response, under weightlessness, 406.
Skylark, 261.
Sleds, liquid *vs.* solids, 305.
Solar sail,
general, 448.
Heliodyne, 911.
photon jets, 637.
Solid propellents,
Aerojet motor, 198.
all-plastic rocket, 200.
burning, 602.
construction, of small rocket, 195.
dimensions, star grain, 194.
high-energy hybrids, 607.
on-site loading, 566, 568.
performance, estimation, 189, 220.
review, 196, 603.
Rocketdyne booster, 199.
second-stage, 188.
shapes, 190.
surveillance, 191.
thermal stresses in grain, 197.
thrust/direction control, 193, 570–1.
use, in U.S.A., 569.
Soviet,
rockets, 78.
satellites, 76, 108, 454, 456.
Space,
biology, 364, 378, 1015.
Commonwealth Agency, 97.
digest, 79.
on the threshold, 65.
research, 71, 81, 100.
U.N. debate, 92.
Space Law
American position, 298.
and Canada, 301.
developments, 303.
general, 740–7, 971–4, 1286–7.
Geneva Conference, 299.
Italian Rocket Association, 304.
developments, 303.
Moon rights, 300.
United Nations, 297, 302.
Space Medicine,
acceleration studies, 41, 46, 394.
closed cycle, 44–5.
cockroaches in space, 359.
feeding, 1013, 1016.
general, 783–790, 794–8, 1011, 1014.
oxygen tension, 393, 395, 397.
reports, 36, 400.
sleep studies, 48.
Spectroscopy,
from rockets, 998.
from satellites, 332.
Staging,
chemical rockets, 662.
general solution, 1040.
optimum, 447, 650.

Structures,
cooling, 480.
Lockheed, 114.
pressurized shells, 74.
problems on, 96, 479, 484.
research, 485.

Temperature,
control of satellites, 483.
distribution in entry vehicle, 757.
measurements, 996.
radiation cooling, 480.
reflecting satellite, 1054–5.
Thermal,
environment simulator, 430.
structures for hypersonic flight, 659.
Thermodynamics, and heat transfer, 16, 69.
Thor, 266, 676, 679.
Thrust,
effect on range, 695.
high, 105.
low, 106.
optimum programming, 693–4.
Time,
dilation, measurements, 1145.
Tiros I, 825.
Tracking,
automatic celestial, 1126.
Avion search systems, 277.
general, 706–7, 710–1.
simplified gear, 276.
Trajectories,
boost glider, 263.
calculations, 535.
Earth—Moon, 533.
equations, 692.
with low-thrust radial acceleration, 162.
equations, 692.
missile, 262.
optimum, 1119, 1121.

Upper atmosphere,
density, 1000.
F_2 layer, 1004.
general, 764–5, 1002–3.
satellite results, 767–8, 776, 839, 1005.
sodium clouds, 766.
Sun, 999.

Van Allen, radiation belts, 26, 83
Vanguard,
information from, 121.
sequence diagram, 107.
success, 452.
testing, 123.
Venus,
colour and clouds, 1.
emission spectrum, 750.
radar echoes, 3.
rotation, 4.
Veronique, 939.
Vibration,
in manned spaceflight, 399.
testing, 246.

Wall cooling,
convective, 325.
in nozzle, 324.
Wave propagation in atmosphere, 1127.
Weightlessness, 365–6, 368, 375–7, 382, 1182–4, 1187.

X-15, 60, 1023–4.

INDEXERS. *Journal:* G. V. E. THOMPSON; *Astronautical Abstracts:* N. H. LANGTON

59.

62.

65.

1182-4,